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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ROBINSON, LAUREN E	

ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
10/30/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/541,462	OHNO ET AL.	
	Examiner	Art Unit	
	LAUREN ROBINSON	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6-11,13,14,16,18-23 and 25-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-11,13,14,16,18-23 and 25-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 7-8, 10-11 and 25-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Maebashi (US Patent No. 5,098,571) as evidenced by Pohanish (Glossary Metal Working Terms, Pg. 305, Published Jan 2003, http://books.google.com/books?id=6zTREw5lrjMC&pg=PP1&lpg=PP1&dq=fusion+bonded+and+polycrystalline&output=html&sig=fIA0JhGtKRTkqCY_Pm6ErL0Bc) and Guo et al. ("Study of Sintering Properties…") .

Maebashi teaches a ceramic filter that is a ceramic porous sintered body (abstract). The body is comprised of ceramic coarse particles (abstract) and as illustrated in Figure 2, the coarse particles "4" have a bonding layer "5" between them in order to make a connection between the coarse particles in the body (Col. 2, lines 47-68). Furthermore, the bonding layer is comprised of ceramic fine particles which are smaller than said coarse particles (Col. 2, lines 47-68). Also, the reference teaches that the particles in the bonding layer are fusion bonded (Col. 3, lines 3-14). The examiner notes that when the ceramic fine particles bond together, they will inherently aggregate themselves within the layer and as evidenced by Pohanish, the bonding layer will be a

polycrystalline body due to polycrystalline being defined as a material produced from aggregates of fine particles bonded together (Pohanish, Pg. 305). Furthermore, the reference teaches that the porous body has an average pore size of from 0.05 to 100 microns **(Claim 1)**.

Even further, the reference teaches that the fine particles that comprise the bonding layer the sintering aid (Col. 1, lines 58-63). The examiner notes that the reference teaches that zirconia and alumina together form an overall sintering aid for the bonding layer. However, they teach that zirconia by itself is a sintering aid and as evidenced by Guo, et. al. alumina is in itself a sintering aid. Therefore, the bonding layer comprising at least one sintering aid from the group consisting of alumina is taught **(Claim 7)**. Also, the examiner notes that the reference discloses that the amount of alumina present in the fine particles comprising the binder is more than the alumina coarse particles (Col. 4, lines 39-45) **(Claim 8)**. Furthermore, the reference teaches that the ratio of the average particle size is within the applicants' range (Col. 2, lines 47-70) **(Claim 10)**. Also, Maebashi teaches that the percent by weight of the alumina in the fine particles should not be more than 90% of the body and the percent by weight of alumina in the entire body needs to be between 80 and 99% (Col. 4, lines 39-45). Therefore, the examiner notes that due to this teaching, the total weight of the ceramic coarse particles to the fine particles is within the applicants' range **(Claim 11)**.

The reference also teaches that the coarse particles can have an average particle size of 20 to 100 microns (Reference, Claim 2) **(Claim 25)** and the fine particles have an average particle diameter of 0.1 to 0.3 microns (Reference claim 3) **(Claim 26)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4, 6 and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Maebashi (US Patent No. 5,098,571) in view of Waku et al. (US Patent No. 5,981,415).

As discussed above, Maebashi teaches a ceramic porous sintered body having the characteristics as set forth in applicants' claim 1. However, Maebashi is *silent with regard to the coarse particles comprising single-crystal particles, the bonding layer being brittle and having strength less than that of the ceramic coarse particles, the fine particles being formed by sintering with the grain boundary remaining and silicon carbide being present in both the coarse particles and the bonding layer.*

Waku et al. teach a porous (Col. 2, lines 57-64) ceramic composite material (Col. 1, lines 5-10) comprised of porous ceramic materials (Col. 2, lines 39-41) which can be used as a filter (Col. 3, lines 1-3). The reference teaches that the composite materials can be comprised of two materials with two different phases (Col. 7, lines 9-14) wherein one of the phases single crystal (abstract) and the other can be polycrystalline (Col. 7, lines 9-14) . The reference discloses that a two phase compositions can be that of one material being alumina and the other being gadolinium alumina (Col. 7, lines 25-35).

Consider *the coarse particles comprising single-crystal particles*

Wake et al. also teach that one phase being single-crystal will result in a structure that has increased mechanical strength with high thermal stability and preferably every phase in the structure is single-crystal (Col. 5, lines 65-67 and Col. 6, lines 1-5).

Maebashi and Waku et al. disclose analogous inventions related to a porous ceramic sintered body comprised of two different particles both comprised of alumina wherein one set of particles has a polycrystalline phase to be used as a filter. While Maebashi is silent with regard to the alumina coarse particle being comprised of single-crystal, the other set of particles are polycrystalline. Also, due to Maebashi teaching one set of polycrystalline and Waku et al. teaching that a polycrystalline group can be combined with a single crystal alumina group one of ordinary skill would find it obvious to add a single-crystal alumina group to the polycrystalline group in the structure. Furthermore, since the polycrystalline group in Maebashi's teaching is the bonding material, they single-crystal group would have to be the coarse particles in the structure. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Maebashi to include that the alumina coarse particles could be comprised of a single crystal phase in order to provide the structure with increased mechanic strength and thermal stability **(Claim 2)**.

Consider the bonding layer being brittle and having strength less than that of the ceramic coarse particles

Waku et al. also teach that the above ceramic materials have high hardness and brittleness (Col. 2, lines 45-50) and they further teach that single crystal phases have high mechanical strength and therefore, it is preferable that all the materials are single crystal (Col. 5, lines 65-67 and Col. 6, lines 1-5). The examiner notes that due to this teaching that it is preferred to have all single crystal phases due to the high strength this phase brings, it is the examiner's position that it would have been obvious to one of ordinary skill that since the single phase is preferred over the polycrystalline phase due to the strength then one of ordinary skill in the art would assume that the single phase would be stronger.

Maebashi and Waku et al. disclose analogous inventions as discussed above. The examiner also notes that as discussed above, Maebashi's teaching includes that the fine particles are polycrystalline and the teaching was modified to include that the coarse particles were single crystal. Due to Waku et al.'s teaching and the obviousness that based on Waku et al.'s reasoning one would assume and find it obvious that a single crystal phase would have greater strength than a polycrystalline phase, it is the examiner's position that it would have been obvious to one of ordinary skill in the art at the time of invention to modify Maebashi's teaching to include that the bonding layer, which is polycrystalline, would be less strong than the coarse particles **(Claim 4)**.

Consider the fine particles being formed by sintering with the grain boundary remaining

Waku et al. also teach that in the ceramic structure, the finer portion of the structure when heated creates a super plastic property and therefore, it is difficult to

obtain high temperature strength (Col. 2, lines 5-12). They also teach that this strength is affected by grain boundaries in the material and therefore they teach that having grain boundaries where the fine portion of the structure is located is ideal (Col. 2, lines 1-17).

Maebashi et al. and Waku et al. disclose analogous art as discussed above. Furthermore, the examiner notes that the finer material within the structure of Maebashi is the bonding layer comprised of the fine particles and that the structures in both references are sintered and used as a filter. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Maebashi's teaching to include that the fine ceramic particles when sintered have a grain boundary remaining in order to maintain strength at high temperatures **(Claim 6)**.

Consider silicon carbide being present in both the coarse particles and the bonding layer.

Waku et al. also teach that silicon carbide has been known to be used in a porous sintered body. They also teach that silicon carbide is used in order to obtain a body with excellent air permeability and mechanical properties such as strength. Furthermore, they teach that when silicon carbide is used it is also used in a body comprised of crystalline coarse particles and crystalline fine particles bound together (Col. 3, lines 60-67 and Col. 4, lines 1-6).

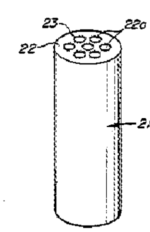
Maebashi and Waku et al. disclose analogous inventions as discussed above. Also, both references teach the need for strength and permeability (Maebashi, Col. 5, lines 25-30). As such, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Maebashi's teaching to include that silicon carbide

can be added to the structure, including in the coarse particles and bonding layer, in order to obtain a porous sintered body with excellent permeability and strength **(Claim 9)**.

3. Claims 13-14 19-20, 22-23 and 27-28 are rejected under 35 U.S.C. 103(a) as being obvious over Maebashi (US Patent No. 5,098,571) as evidenced by Pohanish (Glossary Metal Working Terms, Pg. 305, Published Jan 2003) in view of Larsen et al. (US Patent No. 5,716,559)

Regarding claim 13: As discussed above, Maebashi et al. teach a ceramic porous sintered body comprised of coarse particles bound together by a binder comprised of fine particles which are smaller than said coarse particles and it was evidenced earlier that the binder is polycrystalline. Also, discussed above, the ceramic body has a pore diameter within the applicants' range. The reference also teaches that the ceramic filter comprised of this material with the above mentioned characteristics is a honeycomb like structure (21) which includes a pillar-shaped porous member (22) as illustrated below.

FIG.3



This illustration shows that the filter has a number of through-holes (22a) in its longitude direction (Pg. 2, Col. 1, Par. 6). The examiner interprets the cells (22a) to be a gas passageway since gas can be considered air passing in and out of said cells. While

Maebashi discloses this teaching, the reference is *silent with regard to one end portion of said cells being plugged.*

Larsen et. al. teach a ceramic filter comprised of a ceramic filter green body (sintered body) that filters particulates from hot gases (abstract). The said filter is made by filling a mold with slurry, which contains inorganic colloidal sol as a binder and inorganic particles. The green body is then frozen in the mold and once frozen it is removed to be warmed, air dried and then undergo a final firing step (sinter) (Pg. 1, Col. 2, Par.). The reference teaches from the figures in the reference that the structure is a honeycomb structure comprised of a plurality of pillar-shaped porous members. Larsen et. al. disclose that an array of parallel rows of channels (pillar-shaped porous members comprising cell pathways) is present that are open at one end and closed at the other end (Pg. 1, Col. 2, Par. 3). This is done in order to make filtering particulates flow in the perpendicular direction rather than the parallel direction when used as a filter (Col. 1, lines 45-60).

Maebashi and Larsen et al. disclose analogous inventions related to a ceramic sintered body comprised of a binder comprising fine particulates wherein the binder binds inorganic particles and the body is used as a filter. Also both structures that are used as filter have parallel gas passages. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Maebashi's teaching to include that the filter can have the parallel through holes plugged at either end in order to filter particulates in the perpendicular direction of said filter **(Claim 13)**.

<u>Regarding claims 19-20, 22-23 and 27-28</u>: Also, as discussed above, the bonding layer is comprised of an alumina sintering aid **(Claim 19)**, the sintering aid content was higher in the binder **(Claim 20)**, and both the average size ratio and the ratio of total weight between the fine and coarse particles was also within the applicants' ranges **(Claims 22-23)**.

Furthermore, as discussed above, Maebashi teaches that the average particle size of the coarse particles is within the applicants' range **(Claim 27)** and the average particle size of the fine particles is within the applicants' range **(Claim 28)**.

4. Claims 14, 16, 18 and 21 are rejected under 35 U.S.C. 103(a) as being obvious over Maebashi (US Patent No. 5,098,571) and Larsen et al. (US Patent No. 5,716,559) as applied to claim 13 above, in view of Waku et al. (US Patent No. 5,981,415).

As discussed above, Maebashi teaches a ceramic porous sintered body and was modified to include all the characteristics as set forth in applicants' claim 13. However, Maebashi is *silent with regard to the coarse particle being single crystal, the bonding layer being brittle and having strength less than that of the ceramic coarse particles, the fine particles being formed by sintering with the grain boundary remaining and silicon carbide being present in both the coarse particles and the bonding layer.*

As discussed above, it was determined obvious by Waku et al. to include the above limitations in the reference of Maebashi which the examiner notes that Maebashi's teaching now includes the ends of the plurality of through holes being plugged **(Claims 14, 16, 18 and 21)**.

Response to Arguments

Applicant's arguments filed July 17, 2008 have been fully considered but they are not persuasive. Regarding argument 1. The applicants argue throughout that due to the polycrystalline particles relied upon by the examiner is a sintering aid, that particles will liquefy and therefore, no longer be crystalline when the body is sintered and as such, the reference of Maebashi does not teach the present invention.

The examiner notes that the argument is not persuasive because although sintering aids liquefy during the sintering process, one would recognize that the sintered product must be cooled and it is known in the art that cooling causes liquefied particles to resolidify. Therefore, since the reference teaches that the structure which is made by sintering still has the sintering aid particles therein (Claims 13-14), then one would know that the particles would resolidify in between the coarse particles. Further, one would also recognize that while particle resolidify during cooling, nucleation will occur and one would expect that the nucleation will be inherently polycrystalline, as no special steps are being taught to form amorphous and/or single crystalline structures.

Regarding argument 2: Applicant’s argue on page 8 last paragraph and pages 9-10 that claims 1 and 13 are not taught by any of the secondary references or a combination of said references with the above primary reference.

This is not persuasive for the reasons that the above primary reference does teach applicants’ invention through the process of fully sintering.

.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAUREN ROBINSON whose telephone number is (571)270-3474. The examiner can normally be reached on Monday to Thursday 6am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on 571-2721284. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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